On the future of electricity supply: competitive markets or planned economies?

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2. How intermittent renewables impact prices in electricity markets
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COMPETITION: PRICES = MARGINAL COSTS

Costs, Price (EUR/MWh)

Supply curve

Demand

Hydro, wind
Nuclear

Price = „System“-marginal costs

Demand

e.g. Coal old

e.g. Natural gas new

MWh
Expectation of:

prices = Short-term marginal costs:

(Short-term marginal costs = fuel costs)

due to huge depreciated excess capacities at the beginning of liberalisation!
2 HOW INTERMITTENT RENEWABLES IMPACT PRICES IN ELECTRICITY MARKETS
PRICES WITHOUT AND WITH PV

Price = System marginal costs

Demand \( D_t \)

Supply curve w/o PV

Supply curve w/ PV

Price with PV!
Supply and Demand

RES Production > Demand

Electricity price = high!

RES Production < Demand

Electricity price = 0 (or negative)
CATEGORIES OF „PROBLEMS“

1. Prices decrease to Zero (or below) at a number of days;

2. Lacking contribution margin to fixed costs

3. On how many days will we face high and on how many days low prices?
Given this price pattern it would be attractive for (some) power plant operators to stay in the market

REVISED ENERGY-ONLY MARKET
ARE THESE PRICES TOO HIGH?

New price spreads

\( p_{t1} \) to \( p_{t2} \)
3. SUPPLY SECURITY

Historical (anachronistic) definition:

At every point-of-time every demand has to be met regardless of the costs!

(Note:
Supply security is an energy economic term!

Supply security $\neq$ system reliability!)
4. A MARKET DESIGN

Price: WTP = MC

At times of lowest WTP costs of supply are highest!!!
Classified residual load

How to cover?
By a regulated capacity „market“? 

or 

By competition between supply-side and demand-side technologies (incl. storages and grid)?
OPEN QUESTIONS REGARDING CCP:

Which quantity of capacity where?

How to split in existing and new capacity?

How to tune with grid extension?

Who plans? On national or international level?

E.G. CCP in DE influence operation of Austrian and Swiss hydro storages

Capacity MARKETS?? How should competition take place in a specific region with one supplier?

Or in France???
FLEXIBLE COVERING OF RESIDUAL LOAD

Very high prices (200 EUR/MWh!

Transmission grid

Load reduction due to Demand response to prices

Load reduction due to Demand-side management technical (e.g. cycling)

Extention

Smart Grids

Storages

Flexible power plants

Hours/year
5. THE INTERNATIONAL DIMENSION
DEVELOPMENTS AT SPOT MARKETS

AT, DE, FR, CZ, PL → One market!
THE PLANNING SPIRAL

Financing international?

CCP International

Central European planning commission!

Grid extension Nat./Int.

Storage Internat.

Conclusion: Increasing planning!
THE ALTERNATIVE:
NATIONAL DECENTRAL CAPACITY MARKETS

Statement EWI Cologne, in favour of CCP:
“If we introduce capacity markets they must ensure full supply security. That is to say the capacities we need must at least to some extent be higher than expected demand, including a security margin” (Energy&Management, March 2013)

Now imagine which excess capacity comes about if all European countries to do this on a national level…

→ Huge additional costs!
6. CONCLUSIONS

• The still applied concept of SS is anachronistic
• capacity payments (CP) neglect demand-side which has never been really developed!
• Centralized CP: death of all ideas of competition → head to a strictly planned economy
• National CP: huge excess capacities → very high costs
• most important now: exhaust the full potential of the creativity of all market participants especially of the demand-side!